



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,912	11/21/2003	Tzong Da Ho	55855-DIV (71987)	4010

7590 03/23/2005
EDWARDS & ANGELL, LLP
P.O. Box 9169
Boston, MA 02209

EXAMINER

DUONG, KHANH B

ART UNIT	PAPER NUMBER
----------	--------------

2822

DATE MAILED: 03/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/719,912

Applicant(s) **AK**

HO ET AL

Examiner

Khanh B. Duong

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/21/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the Preliminary Amendment filed on November 21, 2003.

Accordingly, claims 5-8 were cancelled.

Currently, claims 1-4 are pending.

Priority

This application is a Divisional of application No. 09/848,137 filed May 3, 2001, now abandoned.

Specification

The disclosure is objected to because of the following typographical errors on page 1:

line 18, "PAKCAGING" should be --PACKAGING--.

line 20, "MATEERIAL STRUCUTRE" should be --MATERIAL STRUCTURE--.

line 22, "INTERMEALLIC" should be --INTERMETALLIC--.

line 24, "STRUCUTRES" should be --STRUCTURES--.

Appropriate correction is required.

**** Applicant is hereby encouraged to further review the entire content of the specification for other errors.*

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: METHOD OF FABRICATING A THERMALLY ENHANCED WAFER-LEVEL CHIP SCALE PACKAGE.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Kasem et al. (U.S. Patent No. 6,392,290).

Re claim 1, Kasem et al. ("Kasem") discloses in FIGs. 3A-3C [see col. 2, line 59 to col. 3, line 9; and col. 4, line 37 to col. 5, line 9] a method for fabricating a thermally-enhanced wafer-level chip scale package, comprising the steps of:

- (1) preparing a semiconductor wafer having a front side and a back side, and which is predefined into a plurality of integrated circuit chips 11;
- (2) performing a bumping process to bond a plurality of solder bumps 19 on the front side of the semiconductor wafer;
- (3) performing a back-side lapping process to grind away a back-side portion of the semiconductor wafer;
- (4) attaching a thermally-conductive stiffener (backside support substrate) 14 to the back side of the semiconductor wafer;

(5) performing a singulation process to cut apart each chip 11 from the semiconductor wafer; and

(6) performing a flip-chip die bonding process to mount each singulated chip 11 by means of the solder bumps 19 onto a circuited substrate.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kasem in view of Chen et al. (U.S. Patent No. 6,403,882).

Re claims 2 and 3, Kasem discloses attaching the thermally-conductive stiffener 14 to the back side of the semiconductor wafer by means of a conductive epoxy 13. However, Kasem fails to disclose the conductive epoxy 13 being made of silver epoxy and the thermally-conductive stiffener 14 being made of copper.

Chen et al. ("Chen") suggests attaching a thermally-conductive stiffener 50 comprising of copper to the back side of a semiconductor wafer 20 by a conductive adhesive 45 comprising silver epoxy [see col. 2, lines 45-48; and col. 3, lines 15-25].

Since Kasem and Chen are from the same field of endeavor, the purpose disclosed by Chen would have been recognized in the pertinent prior art of Kasem.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method disclosed by Kasem as suggested by Chen since Chen states that the conductive adhesive 45 is selected so that it remains stable during subsequent processing of the chip package at elevated temperatures, and that the thermally-conductive stiffener 50 is selected so that it acts as a heat spreader which increases the thermal performance of the chip package [see col. 3, lines 6-14, and lines 45-52].

Furthermore, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kasem in view of Searls et al. (U.S. Patent No. 6,550,531).

Re claim 4, Kasem fails to disclose the thermally-conductive stiffener 14 being made of copper alloy.

Searls et al. ("Searls") teaches in FIG. 5 a thermally-conductive stiffener 208 comprising copper alloy [see col. 1, lines 31-35].

Since Kasem and Searls are from the same field of endeavor, the purpose disclosed by Searls would have been recognized in the pertinent prior art of Kasem.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method disclosed by Kasem as suggested by Searls because such conductive material is selected so that it acts as a heat sink which increases the thermal performance of the chip package.

Furthermore, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh B. Duong whose telephone number is (571) 272-1836. The examiner can normally be reached on 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



KBD



AMIR ZAFARIAN
SUPERVISOR
TECHNICAL EXAMINER
AMIR ZAFARIAN